

The efficiency of methods for the production of Raman spectra of gases has been increased; this improvement has made it possible, for the first time, to establish precise values for the geometrical dimensions of the benzene molecule. Variations of cosmic ray intensity at sea level have been studied, by means of Geiger counters and similar equipment, at Ottawa and at the Arctic Weather Station at Resolute Bay. To obtain new information on primary cosmic rays and nuclear reactions caused by cosmic rays, several batches of photographic plates have been sent by balloons to altitudes of over 100,000 ft. (Scientists in the United States helped with this project.)

The Pure Chemistry Division is concerned with investigations in the major fields of chemistry—organic, physical, inorganic, and colloid. Most of the work is fundamental—trying to find out why certain chemical reactions behave as they do, and determining the ultimate spatial structure of unknown compounds.

In medical research, there is the closest integration of the Council's fellowship and medical research program with similar programs of the Defence Research Board, the National Cancer Institute, the Canadian Arthritis and Rheumatism Society, and the Federal Departments of National Health and Welfare and of Veterans Affairs. In 1953-54 five consolidated research grants and 160 individual awards were made by the Division of Medical Research and 21 fellowships were provided. The Division also supported, through substantial grants, the production of growth hormone for experimental purposes by the Connaught Medical Research Laboratories.

In conclusion, it should be noted that the results of pure research, owing to its highly theoretical nature and its essentially long-range character, cannot be "pinned down" easily on a year-by-year basis. Nevertheless, one of the Council's projects in pure research won wide popular acclaim, when scientists at the Prairie Regional Laboratory successfully synthesized three sugars—maltose, sucrose (common sugar), and trehalose. This achievement was hailed as one of the outstanding accomplishments of the scientific world in 1953.

## Section 2.—Research in the Atomic Field\*

Atomic energy research in Canada had its origin over 50 years ago when Ernest Rutherford came to this country as Macdonald Professor of Physics at McGill University. There, in collaboration with F. Soddy, he announced in 1902 the results of his investigation of the nature of radioactivity, which had been discovered in 1898 by Henri Becquerel. Rutherford determined the fundamental laws governing spontaneous disintegration of radioactive materials, and went on, both in Canada and in England, to make further discoveries of great importance in the development of atomic energy.

Fundamental research into the structure of the atom continued in many countries on a relatively small though fruitful scale over the ensuing years until the first recognition of nuclear fission was announced in Berlin, Germany, by O. Hahn and F. Strassman on Jan. 6, 1939. Soon it was discovered that when a neutron split a uranium-235 atom, not only was a remarkable quantity of energy released, but also additional neutrons were given off. This suggested the possibility of creating a chain reaction so quick that a new and tremendously powerful explosive would be available for military use.

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